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Properties of concrete using waste iron

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ABSTRACT

Iron filings are considered waste products produced from metalworking processes as small pieces of iron that look like fine powder. In this research, the landfill is the method of dealing with this waste. In the current investigation, iron filings have been employed to determine their appropriateness as a fine aggregate in concrete production. Replacing all or a portion of the fine aggregates with iron filings would result in significant environmental benefits. The replacement percentages of fine aggregate by IR are 0 %, 10 %, 20 %, 30 %, and 40 %. The water cement ratio adopted in this work is 0.58. The experimental investigations in the fresh state show that the slump of the mixtures containing 10%–40 % of iron filings (IR) varied from 71 to 76 mm. The results showed a decrease in the slump of up to 16.47 % for the mixtures containing different percentages of IR compared to the reference mixture. This decrease is evident in mixtures containing IR ratios between 20 % and 40 %. However, the superplasticizer (SP) addition improved each slump and compaction factor. The compressive strength of the mixtures containing 10%–40 % was within the range of (28.21 to 40.44) MPa at 28 days. The flexural strength was within the range (of 4.51 to 6.51) MPa at 28 days. According to the results of this study, the addition of IR decreased the compressive strength and flexural strength by up to 38.51 % and 44.32 percent at the age of 28 days, respectively. The importance of the study comes from the attempt to reuse waste iron filings as fine aggregate to save sources of our environment and contribute to the sustainable concrete industry.

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